

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
18 November 2004 (18.11.2004)

PCT

(10) International Publication Number
WO 2004/099469 A3

(51) International Patent Classification⁷: C25D 5/02 (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(21) International Application Number: PCT/US2004/010489

(22) International Filing Date: 6 April 2004 (06.04.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data: 60/461,477 9 April 2003 (09.04.2003) US

(71) Applicant (for all designated States except US): THE REGENTS OF THE UNIVERSITY OF CALIFORNIA [US/US]; 1111 Franklin Street, 5th Floor, Oakland, CA 94607 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): JIN, Sungho [US/US]; 13634 Old El Camino Real, San Diego, CA 92130 (US).

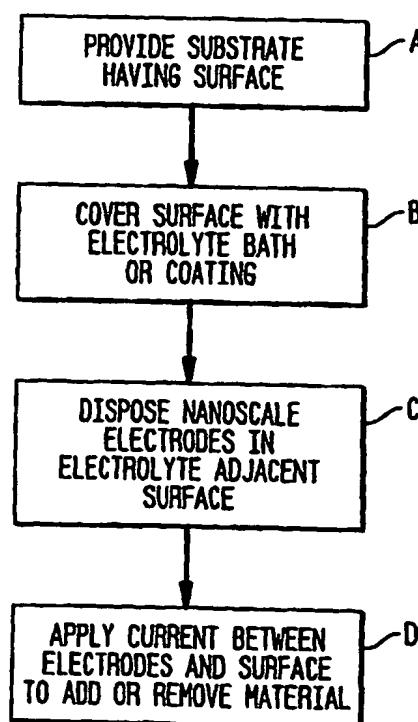
(74) Agent: BOOKS, Glen, E.; Lowenstein Sandler PC, 65 Livingston Avenue, Roseland, NJ 07068 (US).

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report

[Continued on next page]

(54) Title: HIGH RESOLUTION ELECTROLYTIC LITHOGRAPHY, APPARATUS THEREFOR AND RESULTING PRODUCTS



(57) Abstract: In accordance with the invention, a surface of a substrate is patterned by the steps of providing the substrate, covering the surface with electrolyte, and disposing at least one nanoscale electrode in the electrolyte adjacent the surface. A current is then applied between the electrode and the substrate to electrolytically deposit material on or remove material from the surface. The material is deposited or removed in a pattern dependent on the pattern, movement and shape of the nanoscale electrodes. Apparatus for this process and novel products therefrom are also described.



(88) Date of publication of the international search report:
20 January 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/10489

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : C25D 5/02
US CL : 205/118,122,136

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 205/118,122,136

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/0046953 A1 (LEE et al) 25 April 2002 (25.04.2002), paragraphs [0045] to [0056].	1-3,5,7,10-15,18-21,25
Y		----- 26-30
X	US 5,865,978 A (COHEN) 02 February 1999 (02.02.1999), column 3, line 28 to column 14, line 28.	1-17,19,20,22-24
Y	US 5,780,101 A (NOLAN et al) 14 July 1998 (14.07.1998), column 8, lines 30-41.	26
Y	US 6,283,812 B1 (JIN et al) 04 September 2001 (04.09.2001), column 7, lines 47-52 and column 12, lines 34-44.	27,28
Y	EP 1122759 A2 (SAMSUNG SDI CO.) 08 August 2001 (08.08.2001), paragraphs [0008] to [0017].	29
Y	US 2002/0172820 A1 (MAJUMDAR et al) 21 November 2002 (21.11.2002), paragraphs [0029] and [0109].	30

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

08 October 2004 (08.10.2004)

Date of mailing of the international search report

25 OCT 2004

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
Facsimile No. (703) 305-3230

Authorized officer

Brian L. Mutschler

Telephone No. (571) 272-1300

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/10489

Continuation of B. FIELDS SEARCHED Item 3:
EAST: nanotube, nanowire, nanoelectrode, plasma display cell, field emission display, magnetic recording media, quantum dot